

mkcv128s

Velocity-sensitive MIDI keyboard encoder

* user's guide *

1. Purpose

mkcv128s is a small electronic unit, designed to be installed in mechanical keyboard instruments like pianos, organs etc, thus making them capable to transmit MIDI messages for controlling external MIDI gear (expanders, synthesizers etc). **mkcv128s** generates *NoteOn* and *NoteOff* MIDI messages that carry real Velocity information, depending on the speed of key depressing. Also, transmitted is *Sustain* MIDI controller (CC#64), on depressing the 'Sustain' button (or footswitch). For sensing Velocity there should changeover contact actuated by each key. See wiring diagram (**Appendix A**) for details.

2. Wiring mkcv128

a. Contacts

There are 8 labeled cable headers, each 2x8 pins for connecting the key contacts. Two pin of 'I/O' cable header from the opposite side of PCB are dedicated to bussbars. In changeover contacts a contact spring, actuated by key itself is moving between two terminals. When spring is touching upper terminal this indicated *Key Up* position, when spring is touching lower terminal, this indicates *Key Down* position, when spring is not touching any of terminals this indicates *Key Flying* status. This kind of contacts can be found in older systems. Typically upper terminal is being actuated at about 20% of key traveling, while the lower terminal is being actuated at about 80% of key traveling. Measuring the time between actuating upper and lower contact that is proportional to key speed, **mkcv128s** calculates the Velocity byte per key and recognizes key movement direction. The wiring diagram for changeover contacts is shown in **Appendix A**.

b. The rest of wiring

➤ Power

There is no power supply adapter included with this unit. Any power supply unit that is capable to source 100mA at 9-12V AC/DC is suitable for powering this unit. The unit has standard co-axial 0.1" power connector. In case that DC power supply is used, the polarity does not matter, as there is on-board diode bridge that takes carry about polarity. Under normal conditions the unit will draw less than 50 mA of current.

➤ MIDI

The unit has standard MIDI output is capable to drive any standard MIDI input. The unit has standard DIN5 connector that is compatible with standard MIDI cables (cables not included).

➤ I/O

Besides bussbar pins, there are three more pins on 'I/O' header that allow additional control. They can be used for wiring 'Sustain' switch/pedal and 'Reset' button (see wiring diagrams). In normal conditions user does not need 'Reset' button. The 'Reset' pin can be left unconnected. The unit will reset at each powering which is enough for normal use. When the unit is integrated in more sophisticated systems, the Reset pin can be used for Master Reset purposes. The unit will be held in Reset (non-responsive) state until 'Reset' pin is held down. Standard TTL level signals can be applied on this pin.

Sustain switch is mostly used for piano keyboards. When not used it can be left unconnected.

3. Setting and using mkcv128s

Once **mkcv128s** is installed in keyboard, it is turned into standard Velocity sensitive MIDI keyboard.

mkcv128s performs continuous scanning of all key contacts, for detecting their status changes. Scanning process is repeated once in each 3.6 milliseconds, or once in each 1.8 milliseconds, depending on user settings.

This unit can only scan key contacts of change-over type.

Four Velocity-response curves are supported by unit, giving the player freedom to set the key response mapping for most appropriate key feeling. The velocity response curves can be set using proper bits on 'Settings' DIP Switch.

The MIDI channel is user-selectable via 4 bits on 'Settings' DIP Switch. Any MIDI channel (1-16) can be set this way. Tables below show the meaning of each bit in 'Settings' DIP switch (Sw1). Note that bit numbers in these tables reflect the numbers printed on the switch itself (most significant bit being #1, least significant bit being #8).

Table 1. Scanning speed (resolution)

Bit2	Scanning period, mS	Velocity resolution
On	3.6	7 bit
Off	1.8	6 bit, spread over 7 bit range

Table 2. Velocity Response curve

Bit3	Bit4	Velocity resolution
On	On	Linear
On	Off	Logarithmic
Off	On	Exponential
Off	Off	S - type

Table 3. MIDI channel

Bit5	Bit6	Bit7	Bit8	MIDI channel
On	On	On	On	1
On	On	On	Off	2
On	On	Off	On	3
Off	On	Off	Off	4
Off	Off	On	On	5
Off	Off	On	Off	6
Off	Off	Off	On	7
Off	Off	Off	Off	8
Off	On	On	On	9
Off	On	On	Off	10
Off	On	Off	On	11
Off	On	Off	Off	12
Off	Off	On	On	13
Off	Off	On	Off	14
Off	Off	Off	On	15
Off	Off	Off	Off	16

Notes on settings

- The 'Settings' DIP switch is being read by microcontroller once, at system initialization. When changing the settings while the

unit is powered, the changes won't take effect until the unit is switched off, and then (after 5-10 seconds) - back on, or by brief depressing Reset button;

- The red lines in tables above show the factory settings.
- Bit1 of DIP switch is not used in this application and should be always On. When left in Off position, the unit won't respond to key strokes.

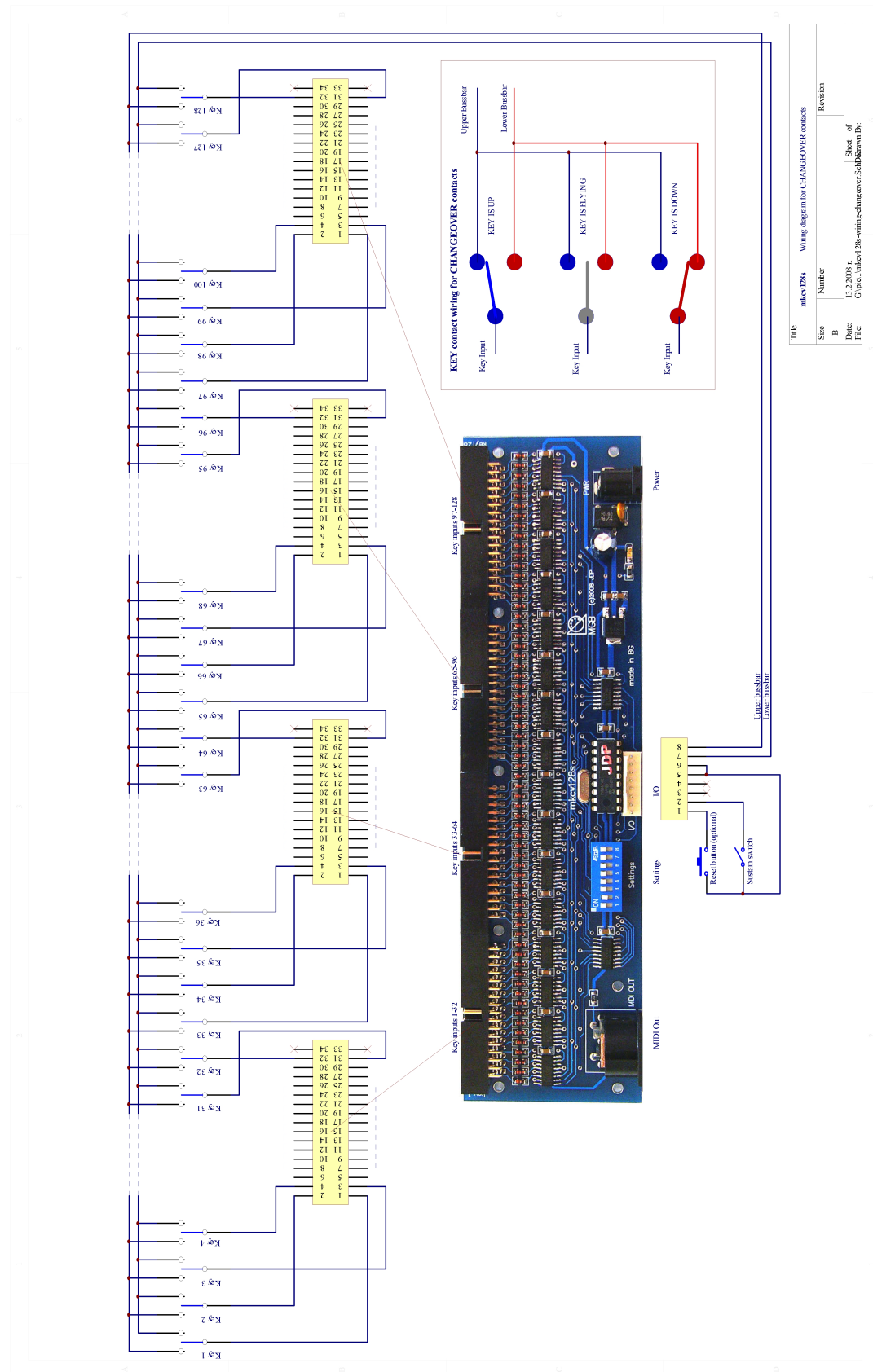
4. Technical parameters.

The most important technical parameters of **mkcv128s** are listed in following table.

Table 4. *Technical parameters*

Parameter	Value	Unit	Comment
Power supply voltage	8/12V AC/DC	V	External adaptor or battery (not included)
Typical current drawn	50	mA	
Max. number of scanned key contacts	128	-	Type of contacts is selectable: changeover/parallel
Scanrate	275	S ⁻¹	
Time resolution	3.6/1.8	mS	
MIDI messages	NoteOn/NoteOff with Velocity, Sustain (CC#64)	-	
MIDI note range	0-127	-	
Velocity range	1-127	-	
MIDI channels	1-16 (user selectable)	-	
Approx. size	21.4 x 5.7	cm	8.5" x 2.3"
Weight	81	g	2.9 oz

Appendix A. mkcv128s wiring diagram for CHANGEOVER contacts



Appendix B. Velocity response curves supported by mkcv128

